Cassini Mission False and True

There are people who are making incorrect statements about NASA's Cassini mission to Saturn. Some of the statements are either misinterpretations or misrepresentations of NASA and European Space Agency (ESA) documents. The purpose of this fact sheet is to address some of the technically incorrect descriptions of potential launch and reentry accidents, and unsubstantiated health impact predictions.

FALSE:

The Cassini mission could use solar power instead of RTGs.

TRUE:

- A Cassini spacecraft equipped with the highest efficiency solar cells available, or even the new high-efficiency cells under development by ESA, would make Cassini too massive for launching to Saturn. The ESA scientists who developed the high-efficiency cells have stated that their cells would not enable a solar powered Cassini mission.
- NASA's primary choice of electrical power for planetary missions has historically been solar. The Mars Observer, Viking Orbiters, and six Mariner missions to Mars all used solar-powered spacecraft.
- RTGs were developed by the Department of Energy (DOE) in response to a need for a compact, reliable source of electrical power for NASA deep space missions. RTGs are used when solar power or other technologies are not feasible.
- NASA has safely used RTGs for three decades on its Apollo, Pioneer, Viking, Voyager, Galileo, and Ulysses missions.

FALSE:

The Titan IV rocket that Cassini will be launched on has been involved in many accidents.

TRUE:

- As of December 1996, there have been 19 Titan IV launches, of which 18 have been successful.
- The single failure in August, 1993 was due to a flaw in one of the solid rocket motors (SRMs) which was induced by a post development repair procedure. This problem has been fixed.

FALSE:

When RTGs are exposed to environments similar to the Challenger accident they could fall to ground and release all of their plutonium dioxide which would then be taken up into the air and then "rain down" on people in populated areas.

TRUE:

- Since 1965, RTGs were designed, built, and tested under accident conditions to ensure the public will be safe under normal and accident situations.
- Even if an accident were to occur that somehow released plutonium dioxide from the RTGs, the potential hazard to people would still be very low.
- The potential hazard would arise from inhaling very fine particles of the plutonium dioxide. The chance of these events happening would be small because the plutonium is in a ceramic form, similar to a coffee cup or dinner plate. This safety feature minimizes the amount of plutonium that could potentially be inhaled by people and helps to keep most of the plutonium dioxide close to an accident site so that it can be safely cleaned up.

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FALSE:

Many people would die if there were a plutonium release from Cassini RTGs involved in a launch accident.

TRUE:

- Based on current analysis, if an accident released plutonium, and if people inhaled some of the fine particles from such a release, the radiation dose an individual would receive over a 50 year period would be on the order of 1 millirem. This 1 millirem is indistinguishable when compared to the dose an average person will receive (over that same 50 year period) from natural radiation sources.
- People are naturally exposed to radiation on a daily basis from our natural environment. This radiation exposure is measured in units of dose called millirem; it can be calculated for a 50 year period, to be about 15,000 millirem from natural sources such as radon, cosmic rays, the Earth, and even from naturally occurring radioactive elements in a person's body.

FALSE:

A single spacecraft failure or small misfire of the Cassini engines would result in an Earth reentry accident.

TRUE:

The probability of an inadvertent earth reentry is extremely unlikely -- less than one in 1 million -- even in the event of a spacecraft failure or misfire of Cassini's engines.

- A swingby accident is conceivable only if an extremely unlikely sequence of events and failures occurs.
- The vast majority of possible spacecraft failures would not alter the spacecraft's trajectory.
- A spacecraft failure or micrometeoroid impact would have to cause a change to the spacecraft's velocity of exactly the proper magnitude and direction to place it on an impacting trajectory.
- Cassini's trajectory will never be pointed directly at the Earth. Only a very small fraction of the micrometeoroid impacts or failures that could possibly change Cassini's velocity would ever place the spacecraft on an Earth-impacting trajectory.
- Additionally, if a spacecraft failure did occur, it would have to be so severe that neither automated on-board systems nor their backup systems nor flight controllers could take corrective action to place the spacecraft on a non-impacting trajectory.

FALSE:

Dr. Ernest Sternglass claims that NASA and DOE have underestimated the potential number of cancer fatalities from a hypothetical Cassini swingby accident.

TRUE:

- In fact, DOE analyses used methods consistent with practices endorsed by independent, national and international radiation protection organizations, such as the International Commission on Radiological Protection.
- In September, 1995 the Jet Propulsion Laboratory (JPL) formally asked Ernest Sternglass to document the basis for his claims about the NASA and DOE analysis. Dr. Sternglass was contacted again in May, 1996, via registered letter, and asked again to validate his claims. He has not responded to either letter.

For more information on the Cassini mission and its nuclear safety, contact Cassini Program Public Information Representative Mary Beth Murrill (818) 354-6478. Internet: Mary.B.Murrill@jpl.nasa.gov